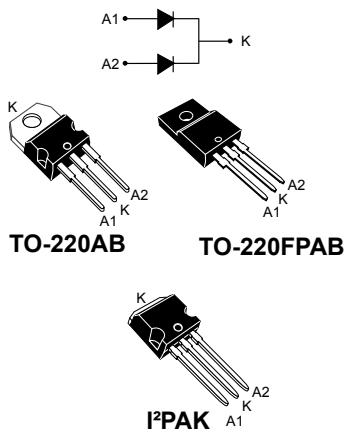


## 120 V power Schottky rectifier



### Features

- High junction temperature capability
- Avalanche capability specified
- Low forward voltage drop current
- High frequency operation
- Insulated package: TO-220FPAB
  - Insulating voltage = 1500 V<sub>RMS</sub>
- ECOPACK®2 compliant

### Applications

- Switching diode
- SMPS
- DC/DC converter
- LED lighting
- Notebook adapter

### Description

This dual center tap Schottky rectifier is optimized for high frequency switch mode power supplies.

Packaged in TO-220AB, I2PAK and TO-220FPAB, the [STPS30L120C](#) provides adaptor designers with an optimized price-performance ratio.

| Product status link         |         |
|-----------------------------|---------|
| <a href="#">STPS30L120C</a> |         |
| Product summary             |         |
| Symbol                      | Value   |
| $I_{F(AV)}$                 | 2 x 15A |
| $V_{RRM}$                   | 120 V   |
| $T_j$ (max.)                | 150 °C  |
| $V_F$ (typ.)                | 0.65 V  |

## 1 Characteristics

**Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified, per diode)**

| Symbol       | Parameter                                             |                                    | Value       | Unit |
|--------------|-------------------------------------------------------|------------------------------------|-------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage                       |                                    | 120         | V    |
| $I_{F(RMS)}$ | Forward rms current                                   |                                    | 30          | A    |
| $I_{F(AV)}$  | Average forward current, $\delta = 0.5$ square wave   | Per diode                          | 15          | A    |
|              |                                                       | Per device                         | 30          |      |
| $I_{FSM}$    | Surge non repetitive forward current                  | $t_p = 10$ ms sinusoidal           | 220         | A    |
| $P_{ARM}$    | Repetitive peak avalanche power                       | $t_p = 10$ $\mu$ s, $T_j = 125$ °C | 828         | W    |
| $T_{stg}$    | Storage temperature range                             |                                    | -65 to +175 | °C   |
| $T_j$        | Maximum operating junction temperature <sup>(1)</sup> |                                    | 150         | °C   |

1.  $(dP_{tot}/dT_j) < (1/R_{th(j-a)})$  condition to avoid thermal runaway for a diode on its own heatsink.

**Table 2. Thermal resistance parameters**

| Symbol        | Parameter        |                              | Value     | Unit |
|---------------|------------------|------------------------------|-----------|------|
| $R_{th(j-c)}$ | Junction to case | TO-220AB, I <sup>2</sup> PAK | Per diode | 1.3  |
|               |                  |                              | Total     | 0.7  |
|               |                  | TO-220FPAB                   | Per diode | 4.5  |
|               |                  |                              | Total     | 3.8  |
| $R_{th(c)}$   | Coupling         | TO-220AB, I <sup>2</sup> PAK |           | 0.1  |
|               |                  | TO-220FPAB                   |           | 3    |

When the diodes 1 and 2 are used simultaneously:

$$T_j(\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

For more information, please refer to the following application note:

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

**Table 3. Static electrical characteristics (per diode)**

| Symbol      | Parameter               | Test conditions |                 | Min. | Typ.  | Max.  | Unit    |
|-------------|-------------------------|-----------------|-----------------|------|-------|-------|---------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25$ °C   | $V_R = V_{RRM}$ | -    |       | 200   | $\mu$ A |
|             |                         | $T_j = 125$ °C  |                 | -    | 12    | 35    | mA      |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25$ °C   | $I_F = 5$ A     | -    |       | 0.675 | V       |
|             |                         | $T_j = 125$ °C  |                 | -    | 0.51  | 0.57  |         |
|             |                         | $T_j = 25$ °C   | $I_F = 15$ A    | -    |       | 0.88  |         |
|             |                         | $T_j = 125$ °C  |                 | -    | 0.65  | 0.71  |         |
|             |                         | $T_j = 25$ °C   | $I_F = 30$ A    | -    |       | 1.08  |         |
|             |                         | $T_j = 125$ °C  |                 | -    | 0.755 | 0.84  |         |

1. Pulse test:  $t_p = 5$  ms,  $\delta < 2\%$

2. Pulse test:  $t_p = 380 \mu s$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

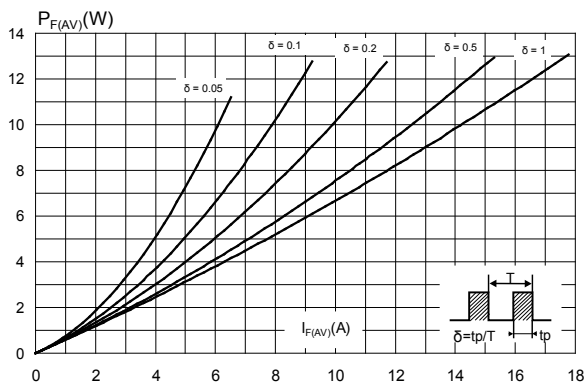
$$P = 0.58 \times I_{F(AV)} + 0.0087 \times I_{F(RMS)}^2$$

For more information, please refer to the following application notes related to the power losses :

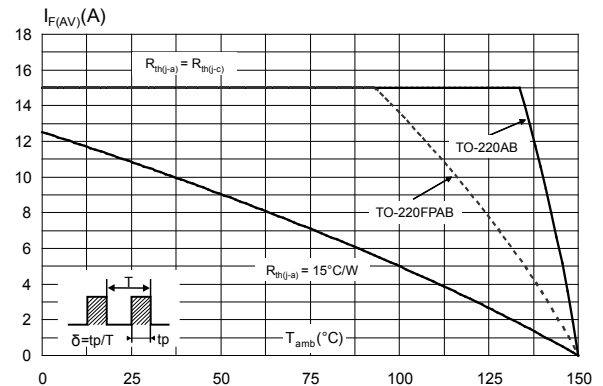
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

## 1.1 Characteristics (curves)

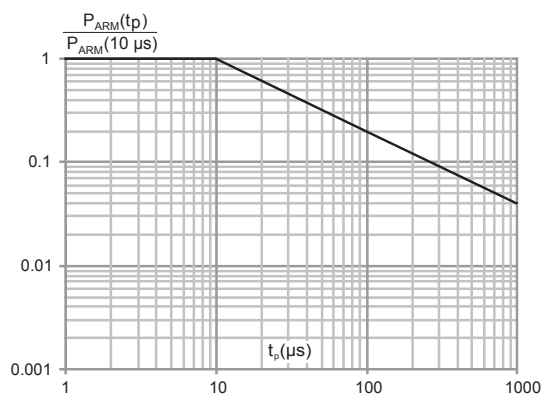
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



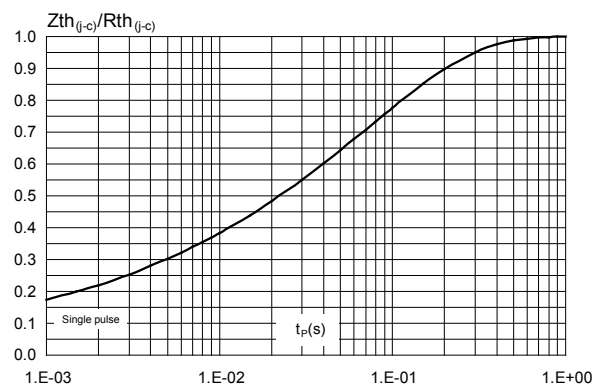
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



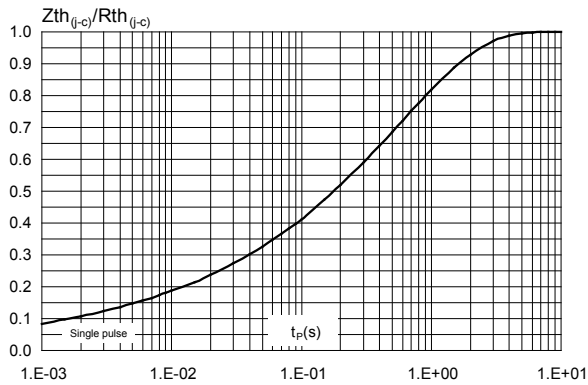
**Figure 3. Normalized avalanche power derating versus pulse duration ( $T_j = 125^\circ\text{C}$ )**



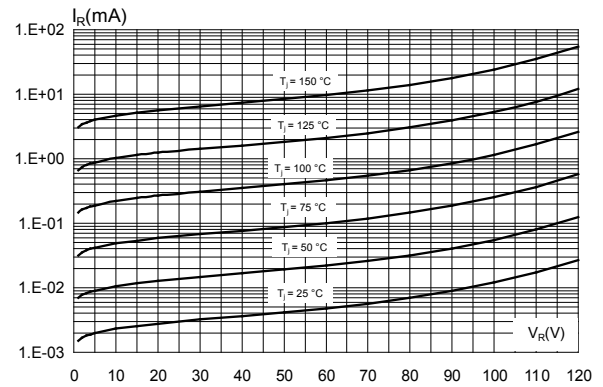
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, I<sup>2</sup>PAK)**



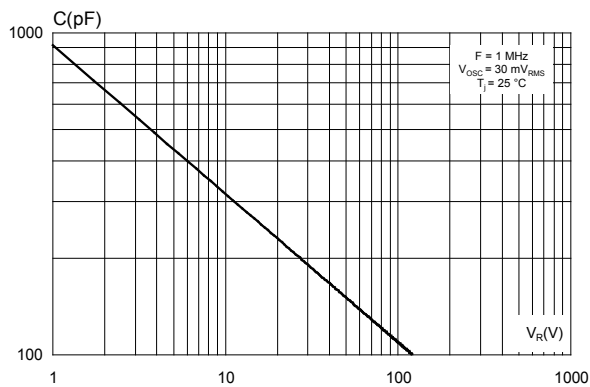
**Figure 5. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)**



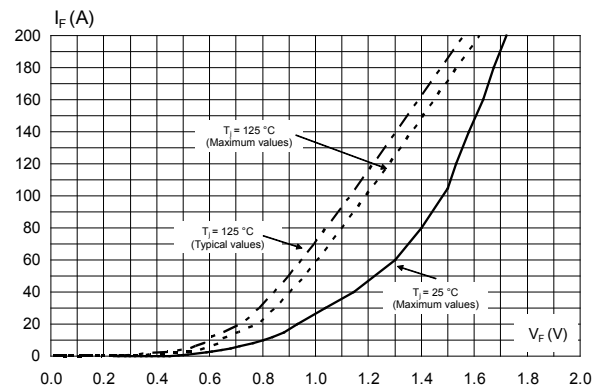
**Figure 6. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



**Figure 7. Junction capacitance versus reverse voltage applied (typical values, per diode)**



**Figure 8. Forward voltage drop versus forward current (per diode)**



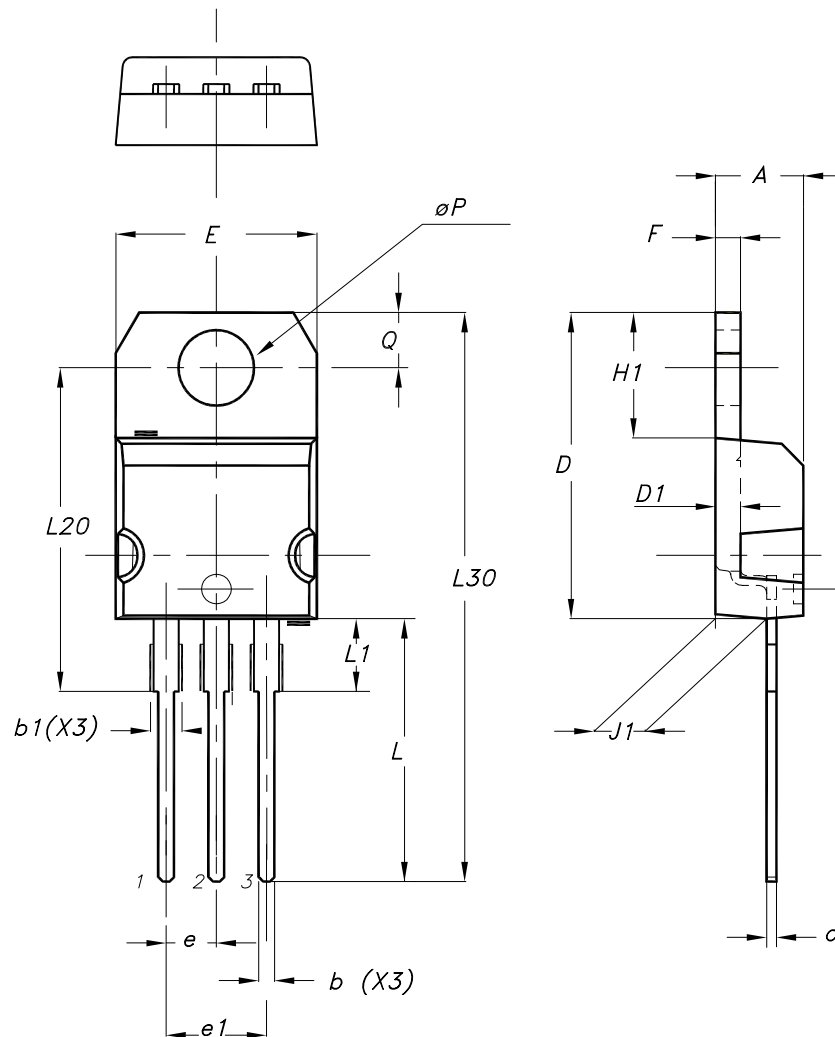
## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

### 2.1 TO-220AB package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

**Figure 9. TO-220AB package outline**



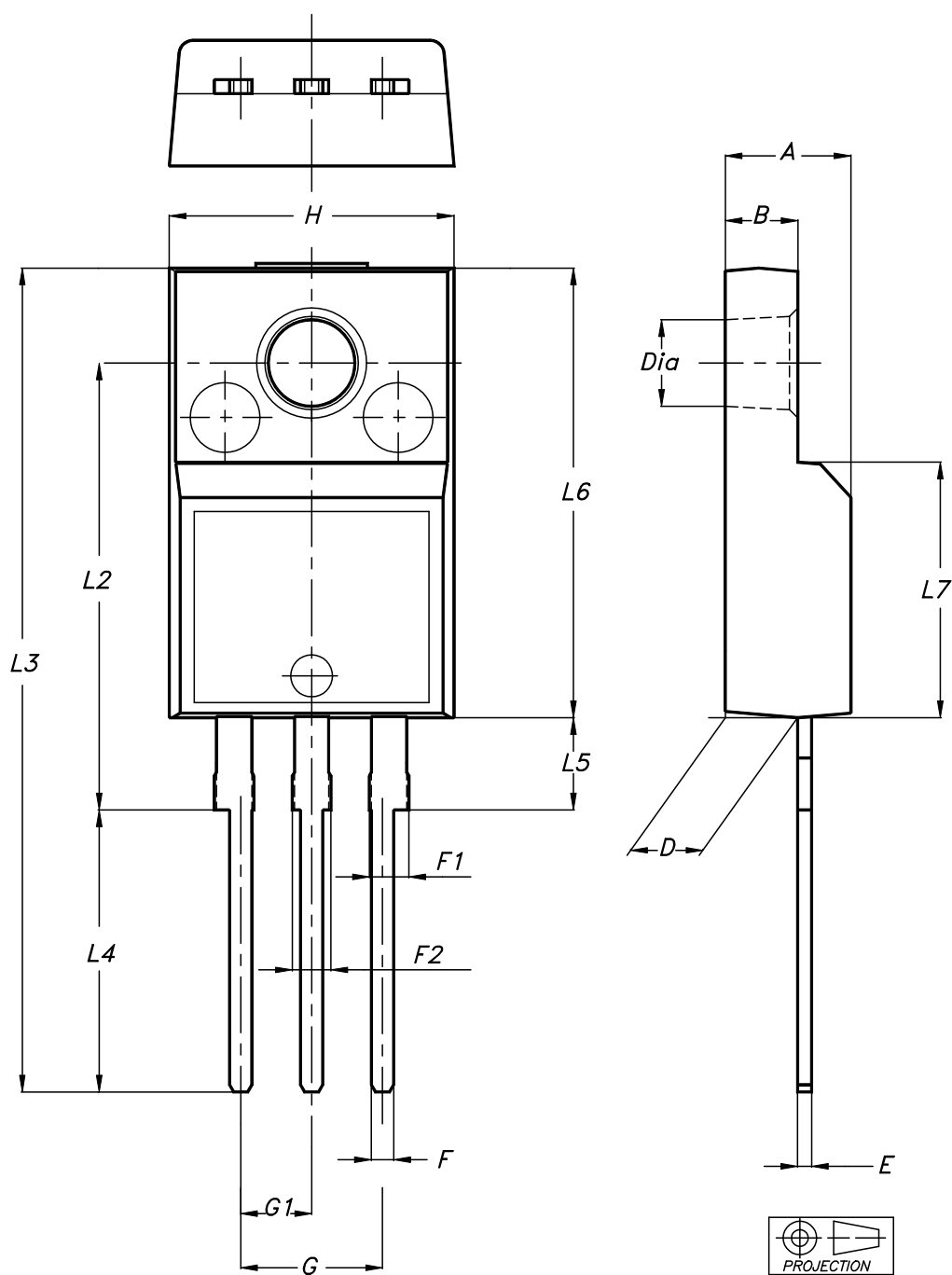
**Table 4. TO-220AB package mechanical data**

| Ref. | Dimensions  |       |                             |       |
|------|-------------|-------|-----------------------------|-------|
|      | Millimeters |       | Inches (for reference only) |       |
|      | Min.        | Max.  | Min.                        | Max.  |
| A    | 4.40        | 4.60  | 0.173                       | 0.181 |
| b    | 0.61        | 0.88  | 0.240                       | 0.035 |
| b1   | 1.14        | 1.55  | 0.045                       | 0.061 |
| c    | 0.48        | 0.70  | 0.019                       | 0.028 |
| D    | 15.25       | 15.75 | 0.600                       | 0.620 |
| D1   | 1.27 typ.   |       | 0.050 typ.                  |       |
| E    | 10.00       | 10.40 | 0.394                       | 0.409 |
| e    | 2.40        | 2.70  | 0.094                       | 0.106 |
| e1   | 4.95        | 5.15  | 0.195                       | 0.203 |
| F    | 1.23        | 1.32  | 0.048                       | 0.052 |
| H1   | 6.20        | 6.60  | 0.244                       | 0.260 |
| J1   | 2.40        | 2.72  | 0.094                       | 0.107 |
| L    | 13.00       | 14.00 | 0.512                       | 0.551 |
| L1   | 3.50        | 3.93  | 0.138                       | 0.155 |
| L20  | 16.40 typ.  |       | 0.646 typ.                  |       |
| L30  | 28.90 typ.  |       | 1.138 typ.                  |       |
| θP   | 3.75        | 3.85  | 0.148                       | 0.152 |
| Q    | 2.65        | 2.95  | 0.104                       | 0.116 |

## 2.2 TO-220FPAB package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

**Figure 10.** TO-220FPAB package outline



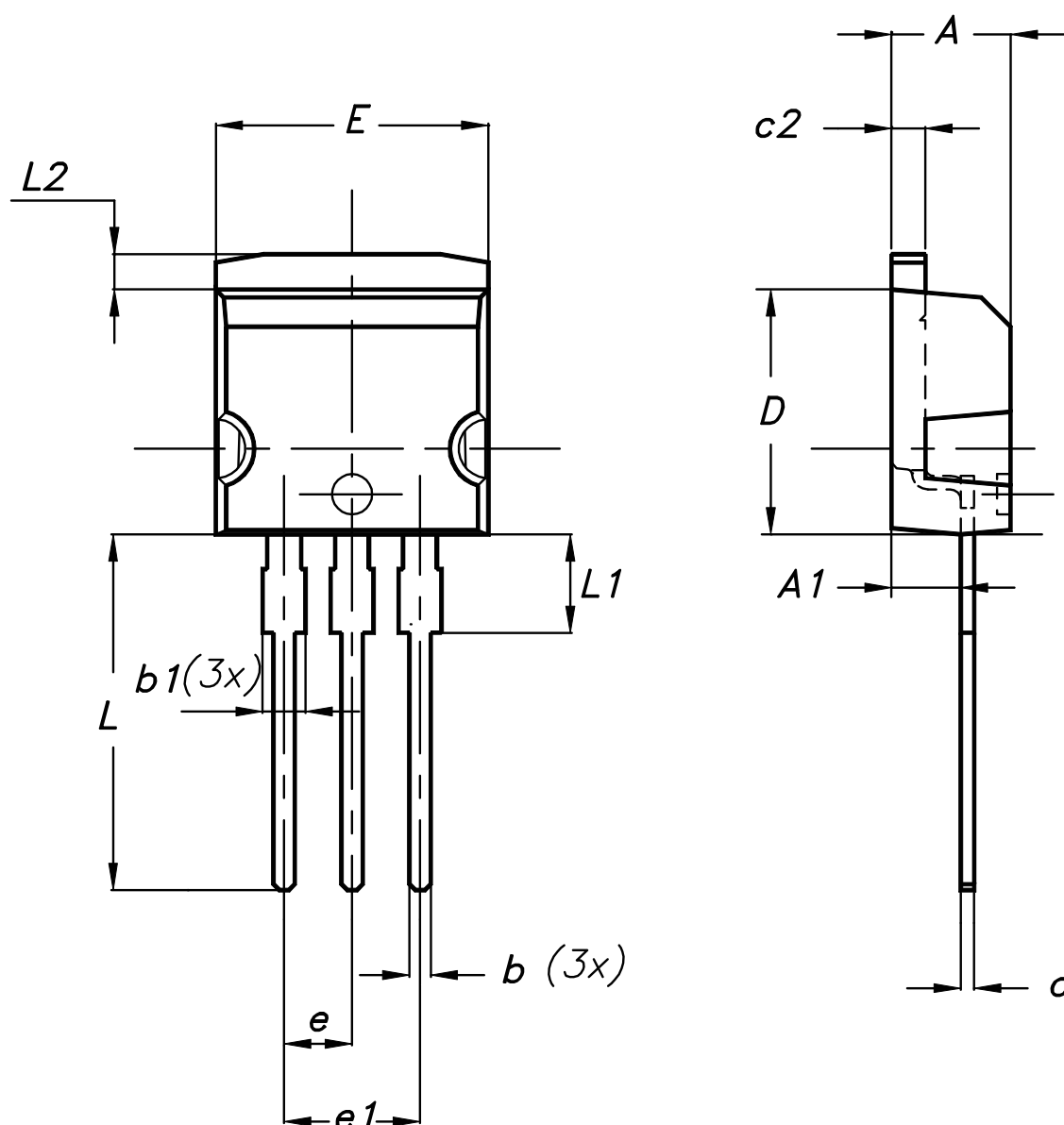
**Table 5. TO-220FPAB package mechanical data**

| Ref. | Dimensions  |       |                             |        |
|------|-------------|-------|-----------------------------|--------|
|      | Millimeters |       | Inches (for reference only) |        |
|      | Min.        | Max.  | Min.                        | Max.   |
| A    | 4.40        | 4.60  | 0.1739                      | 0.1818 |
| B    | 2.50        | 2.70  | 0.0988                      | 0.1067 |
| D    | 2.50        | 2.75  | 0.0988                      | 0.1087 |
| E    | 0.45        | 0.70  | 0.0178                      | 0.0277 |
| F    | 0.75        | 1.00  | 0.0296                      | 0.0395 |
| F1   | 1.15        | 1.70  | 0.0455                      | 0.0672 |
| F2   | 1.15        | 1.70  | 0.0455                      | 0.0672 |
| G    | 4.95        | 5.20  | 0.1957                      | 0.2055 |
| G1   | 2.40        | 2.70  | 0.0949                      | 0.1067 |
| H    | 10.00       | 10.40 | 0.3953                      | 0.4111 |
| L2   | 16.00 typ.  |       | 0.6324 typ.                 |        |
| L3   | 28.60       | 30.60 | 1.1304                      | 1.2095 |
| L4   | 9.80        | 10.60 | 0.3874                      | 0.4190 |
| L5   | 2.90        | 3.60  | 0.1146                      | 0.1423 |
| L6   | 15.90       | 16.40 | 0.6285                      | 0.6482 |
| L7   | 9.00        | 9.30  | 0.3557                      | 0.3676 |
| Dia  | 3.00        | 3.20  | 0.1186                      | 0.1265 |

## 2.3 I<sup>2</sup>PAK package information

- Epoxy meets UL 94, V0
- Cooling method: by conduction (C)

Figure 11. I<sup>2</sup>PAK package outline



**Table 6.** I<sup>2</sup>PAK package mechanical data

| Ref. | Dimensions  |       |                             |       |
|------|-------------|-------|-----------------------------|-------|
|      | Millimeters |       | Inches (for reference only) |       |
|      | Min.        | Max.  | Min.                        | Max.  |
| A    | 4.40        | 4.60  | 0.173                       | 0.181 |
| A1   | 2.40        | 2.72  | 0.094                       | 0.107 |
| b    | 0.61        | 0.88  | 0.024                       | 0.035 |
| b1   | 1.14        | 1.70  | 0.044                       | 0.067 |
| c    | 0.49        | 0.70  | 0.019                       | 0.028 |
| c2   | 1.23        | 1.32  | 0.048                       | 0.052 |
| D    | 8.95        | 9.35  | 0.352                       | 0.368 |
| e    | 2.40        | 2.70  | 0.094                       | 0.106 |
| e1   | 4.95        | 5.15  | 0.195                       | 0.203 |
| E    | 10.00       | 10.40 | 0.394                       | 0.409 |
| L    | 13.00       | 14.00 | 0.512                       | 0.551 |
| L1   | 3.50        | 3.93  | 0.138                       | 0.155 |
| L2   | 1.27        | 1.40  | 0.050                       | 0.055 |

### 3 Ordering Information

**Table 7. Ordering information**

| Order code    | Marking       | Package            | Weight | Base qty. | Delivery mode |
|---------------|---------------|--------------------|--------|-----------|---------------|
| STPS30L120CT  | STPS30L120CT  | TO-220AB           | 1.95 g | 50        | Tube          |
| STPS30L120CFP | STPS30L120CFP | TO-220FPAB         | 1.90 g | 50        |               |
| STPS30L120CR  | STPS30L120CR  | I <sup>2</sup> PAK | 1.50 g | 50        |               |

## Revision history

**Table 8. Document revision history**

| Date        | Version | Changes                                                                                                                                                                                                                                                                                                            |
|-------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 28-Sep-2009 | 1       | First issue.                                                                                                                                                                                                                                                                                                       |
| 17-Feb-2010 | 2       | Updated Table 2. Added Figure 1 and Figure 13.                                                                                                                                                                                                                                                                     |
| 26-May-2011 | 3       | Added I2PAK package.                                                                                                                                                                                                                                                                                               |
| 03-Jul-2018 | 4       | Removed figure 5, figure 6, figure 7, figure 13.<br>Updated Figure 3. Normalized avalanche power derating versus pulse duration ( $T_j = 125\text{ °C}$ ) and Table 1. Absolute ratings (limiting values at $25\text{ °C}$ , unless otherwise specified, per diode).<br>Minor text changes to improve readability. |

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